Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

COMPUTER SCIENCE **9608/12**

Paper 1 Theory Fundamentals **May/June 2020**

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use an HB pencil for any diagrams, graphs or rough working.
- Calculators must **not** be used in this paper.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].
- No marks will be awarded for using brand names of software packages or hardware.

This document has **16** pages. Blank pages are indicated.

[Turn over

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1 Samira is creating an interactive, multimedia presentation for the entrance to her hotel.

(a) The presentation will be on a device that has a resistive touchscreen for user input.

Complete the following paragraph about the basic operation of a resistive touchscreen.

The resistive touchscreen has two layers with ..... between the layers. When a finger touches the screen, the ..... moves to touch the ..... ; this creates a point of contact.

The ..... and ..... position of this point is calculated.

[4]

(b) Samira uses a computer to draw a logo for her hotel and saves it as a vector graphic. The logo will be placed on the multimedia presentation and elsewhere, such as on signs at the entrance of the hotel.

Samira emails the logo to a company that prints signs, and other documentation for the hotel.

(i) Describe how the logo is represented by the computer.

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..... [3]

(ii) State **two** reasons why the hotel **logo** is saved as a vector graphic instead of a bitmapped graphic.

1 .....

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2 .....

.....

[2]

2 Amir has created a sound file using his desktop computer.

(a) Complete the table by writing the missing definitions and term about sound.

Term	Definition
Sampling	....
....	The number of samples per unit time
Sampling resolution	....

[3]

(b) The file is too large to be emailed and the file size needs to be reduced.

(i) Name **one** lossless compression technique that can be used to reduce the size of the sound file.

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..... [1]

(ii) Describe **one** lossy compression technique that can be used to reduce the size of the sound file.

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..... [2]

(c) Amir's computer has system software, including utility software and an operating system.

(i) Explain how the disk formatter, disk contents analysis and disk repair utilities work together.

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..... [3]

(ii) Amir's computer has several peripheral devices connected to it.

State **three peripheral** management tasks performed by the operating system.

Task 1 .....

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Task 2 .....

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Task 3 .....

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[3]

(iii) The peripheral devices are plugged into USB ports of the computer.

Describe **two** benefits of connecting the peripheral devices using a USB port.

1 .....

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2 .....

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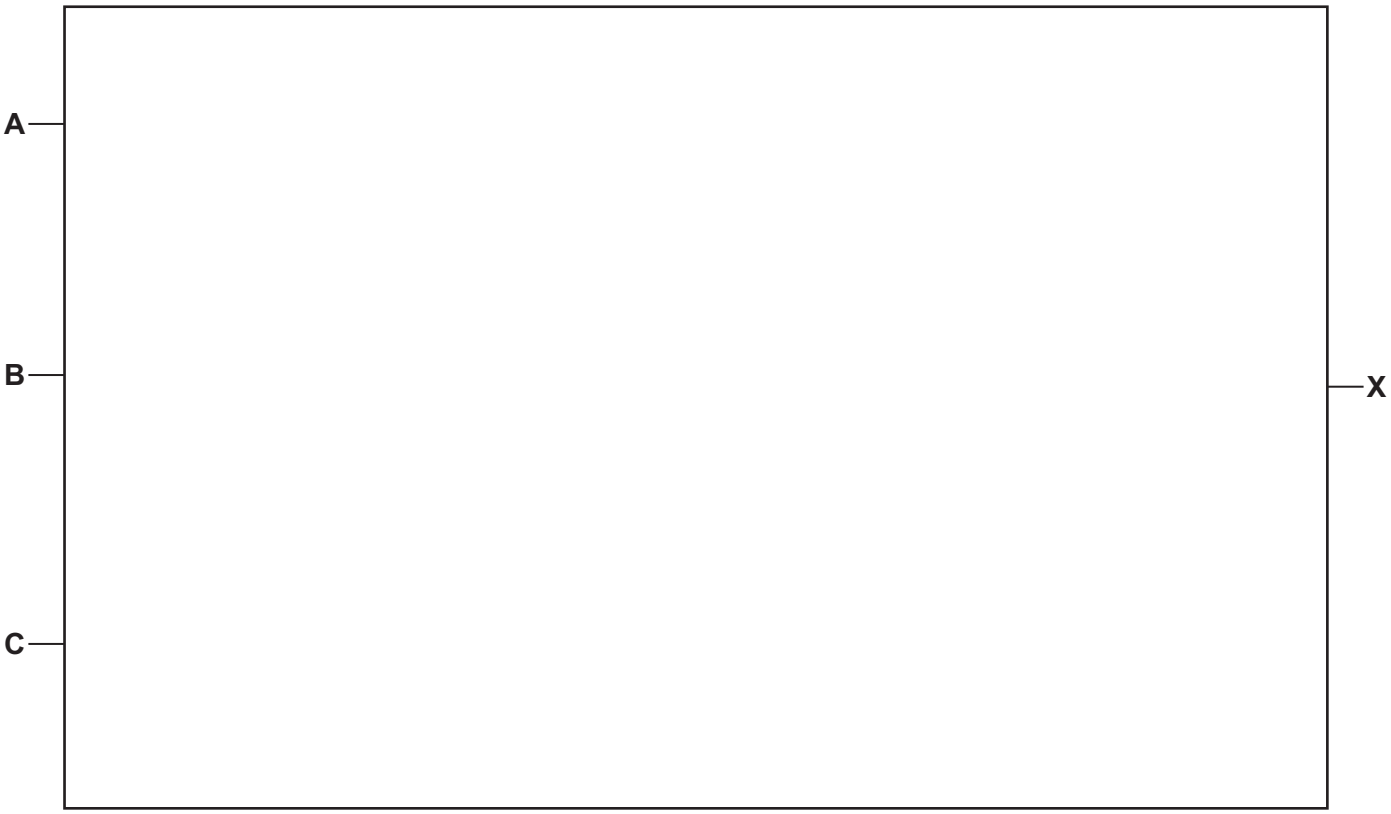
[4]

3 The following is a logic expression.

X = NOT (**A** AND **B**) OR NOT (NOT **B** OR **C**)

Draw the logic circuit for the given expression using a maximum of **four** gates.



[4]

4 Sophie is about to start a new job as a junior software developer.

(a) She is worried about joining a new team of people.

(i) State **one ethical** action that Sophie can take to help her to feel more confident about starting work.

.....

..... [1]

(ii) State **two ethical** actions that Sophie's manager can take to help Sophie to feel more confident about starting work.

1 .....

.....

2 .....

..... [2]

(iii) State **one ethical** action that Sophie's new colleagues can take to help Sophie to feel more confident about starting work.

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..... [1]

(b) Explain why Sophie is asked to sign a professional code of conduct before starting work.

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..... [3]

5 **(a)** The steps 1 to 6 describe the first pass of a two-pass assembler.

The following three statements are used to complete the sequence of steps.

A	If it is already in the symbol table, it checks to see if the absolute address is known
B	When it meets a symbolic address, it checks to see if it is already in the symbol table
C	If it is known, it is entered

Write one of the letters **A**, **B** or **C** in the appropriate step to complete the sequence.

1. The assembler reads the assembly language instructions
2. .....
3. If it is not, it adds it to the symbol table
4. .....
5. .....
6. If it is not known, it is marked as unknown.

[2]

(b) The assembler translates assembly code into machine code.

The table shows the denary values for three assembler op codes.

Op code	Denary value
`LDD`	194
`ADD`	200
`STO`	205

(i) Convert the denary value for the op code `LDD` into 8-bit binary.

[1]

(ii) Convert the denary value for the op code `STO` into hexadecimal.

..... [1]

(iii) State why the denary value for the op code `ADD` cannot be represented in 8-bit two's complement form. Justify your answer.

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..... [2]

[Turn over

(c) The table shows part of the instruction set for a processor. The processor has one general purpose register, the Accumulator (ACC), and an Index Register (IX).

Instruction		Explanation
Op code	**Operand**	
LDM	#n	Immediate addressing. Load the denary number n to ACC
LDD	<address>	Direct addressing. Load the contents of the location at the given address to ACC
LDX	<address>	Indexed addressing. Form the address from <address> + the contents of the Index Register. Copy the contents of this calculated address to ACC
LDR	#n	Immediate addressing. Load the denary number n to IX
STO	<address>	Store contents of ACC at the given address
ADD	<address>	Add the contents of the given address to ACC
INC	<register>	Add 1 to the contents of the register (ACC or IX)
CMP	<address>	Compare contents of the address given with the contents of ACC
JPE	<address>	Following a compare instruction, jump to <address> if the compare was True
JPN	<address>	Following a compare instruction, jump to <address> if the compare was False
JMP	<address>	Jump to the given address
OUT		Output to screen the character whose ASCII value is stored in ACC
END		Return control to the operating system

Complete the trace table for the following assembly language program. The first instruction has been completed for you.

Address	Instruction
20	LDD 103
21	CMP 101
22	JPE 30
23	LDD 100
24	ADD 101
25	STO 100
26	LDD 103
27	INC ACC
28	STO 103
29	JMP 20
30	END
...	
100	1
101	2
102	3
103	0

Instruction address	ACC	Memory address			
		100	101	102	103
		1	2	3	0
20	0				

[6]

6 A software development company has a relational database, SOFTWARE_MANAGEMENT. The database stores details of the customers who have purchased software, as well as the software and licences that customers have purchased.

The SOFTWARE_MANAGEMENT database has the following tables:

CUSTOMER_DETAILS(CustomerID, CompanyName, Address1, Address2, City)

SOFTWARE_PURCHASED(SoftwareName, SoftwareDescription, CustomerID,
LicenceType, LicenceCost, RenewalDate)

(a) Explain why this database is **not** in Third Normal Form (3NF). Refer to the tables in your answer.

Do **not** attempt to normalise the tables.

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..... [2]

(b) Give an example from the database SOFTWARE_MANAGEMENT for each of the following database terms.

Term	Example
Entity	
Foreign key	
Attribute	

[3]

(c) The company also develops computer games. They extend the relational database SOFTWARE_MANAGEMENT by adding a new table. The new table, GAME_DEVELOPMENT, stores details about the games and the software development teams creating them.

The table shows example data in GAME_DEVELOPMENT.

GameName	Genre	TeamNumber	DevelopmentStage	ManagerID
Bunny Hop	Platform	4	Analysis	23KP
Fried Eggs	Retro	2	Programming stage 1	9RTU
Create-a-game	Action	1	Acceptance testing	11TF

(i) Complete the Data Definition Language (DDL) statement to create the table GAME_DEVELOPMENT.

```
CREATE ……  …… (
  GameName VarChar,
  Genre VarChar,
  ……  …… ,
  DevelopmentStage VarChar,
  ManagerID VarChar,
  …… (GameName)
);
```

[5]

(ii) Another table, PRODUCT_MANAGER, is created.

PRODUCT_MANAGER(ManagerID, FirstName, LastName)

Complete the Data Manipulation Language (DML) statement to return the game name, genre and team number of all games managed by the product manager with the first name ‘James’ and the last name ‘Fitz’.

```
…… GameName, Genre, TeamNumber
FROM GAME_DEVELOPMENT, PRODUCT_MANAGER
WHERE PRODUCT_MANAGER.FirstName = "James"
AND PRODUCT_MANAGER.LastName = "Fitz"
AND ……
    = …… ;
```

[3]

7 A company allows customers to stream music from its servers over the Internet.
The company's internet connection is currently provided through copper cables.

(a) Identify **two** pieces of hardware, other than the cables, that enable the servers to connect to the Internet. Describe the purpose of each device.

Device 1 .....

Purpose .....

.....

.....

Device 2 .....

Purpose .....

.....

.....

[4]

(b) The company wants to upgrade their internet connection to fibre-optic cables.

Give **one** benefit and **one** drawback to the company of upgrading to fibre-optic cables.

Benefit .....

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Drawback .....

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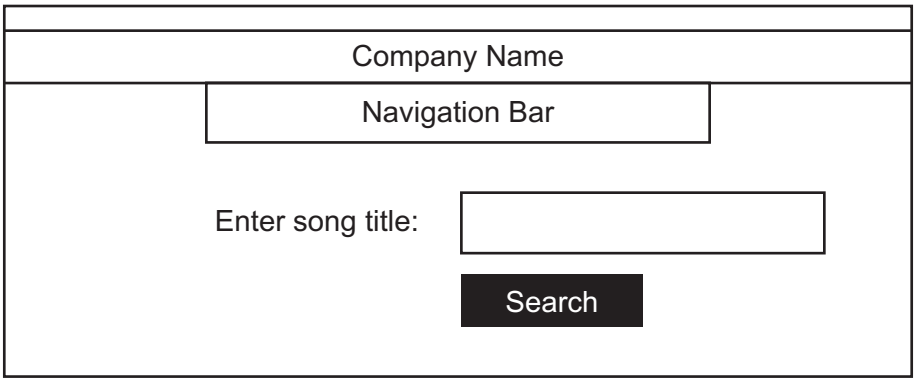
[2]

(c) A customer enters a song title into a web page to listen to the song. The design of the web page is shown:



The web page will make use of both client-side and server-side scripting.

(i) Explain how client-side scripting will be used in this web page.

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..... [3]

(ii) Explain how server-side scripting will be used after the customer clicks the 'Search' button.

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..... [2]

[Turn over

(d) The company needs to keep the data on its servers secure from online threats.

(i) Describe how a firewall will help to protect the data on the servers from online threats.

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..... [2]

(ii) Give **one additional** security measure that the company can use to protect the data on the servers from online threats.

..... [1]